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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

ELLINGTON, ALANDRA

ART UNIT PAPER NUMBER

2855

DATE MAILED: 11/07/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/900,743

Applicant(s)

TAI ET AL.

Examiner

Alandra N Ellington

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 22 August 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-67 is/are pending in the application.
- 4a) Of the above claim(s) 16-27 and 47-59 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 28-46 and 60-67 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 16-27 and 47-59 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 22 May 2002 is: a) ☐ approved b) ☒ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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The amendment filed on 8/22/02 has been received and entered in the case.

Oath/Declaration

The objections made to the declaration have been overcome by the applicant's amendment.

Drawings

1. New corrected drawings are required in this application because the drawings are too dark and it is hard to decipher the difference between elements in the figures. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.
2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "outer periphery of the substrate" and "over pressure protection part" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 43, 61, and 65-67 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 35 recites “said surface micromachined pressure sensor *elements*” which makes the statement unclear and ambiguous. Are there a more than one surface micromachined pressure sensor?

Claim 43 recites “formed on a device other than said membrane”, which makes the statement unclear and ambiguous. What “device” is being referred to? Is the additional resistor formed on the substrate or the device?

Claim 61 recites “said substrate includes an extending portion at an area near a center of said diaphragm” which makes statement unclear and ambiguous. It is not fully understood what the applicant is referring to as “an extending portion” of the substrate. This feature was not clearly shown in the drawings.

Claim 65 recites “protecting said device against pressures which are higher than a designed-for amount”, which makes the statement unclear and ambiguous. It is not fully understood what is meant by “a *designed-for* amount”. Also, it is not fully understood as to what the applicant is referring to as the “over pressure protection part.” This element was not clearly represented in the drawings.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

6. Claims 1-10, 15, 28-41, and 44-45 are rejected under 35 U.S.C. 102(e) as being anticipated by Fisher (6,378,378). Fisher discloses a device as claimed (see Figs. 1-28 and respective portions of the specification).

Referring to claim 1, Fisher discloses a device, comprising:

A substrate 46 (col. 5 line 1); and

A surface micromachined pressure sensor 44, formed on said substrate 46, and formed to be capable of sensing high pressure (col. 4 lines 40-58,66-67, col. 5 line 1).

Referring to claim 2, Fisher discloses a device as in claim 1, wherein said pressure sensor 44 includes at least a plurality of strain sensitive resistors 52 (col. 5 lines 8-11).

Referring to claim 3, Fisher discloses a device as in claim 2, wherein said strain sensitive resistors 52 are arranged into a Wheatstone bridge 76 (col. 6 lines 30-34 {Fig. 5G}).

Referring to claim 4, Fisher discloses a device as in claim 2, wherein said strain sensitive resistors 52 are formed of deposited polysilicon (col. 5 lines 4-12 {Figs. 5E, 5F}).

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Referring to claim 5, Fisher discloses a device as in claim 2, wherein said surface micromachined pressure sensor 44 includes a diaphragm layer 48, formed from a silicon nitride layer 64,70 (col. 5 lines 62-68, col. 6 lines 1-3 {Fig. 5E}).

Referring to claim 6, Fisher discloses a device as in claim 5, wherein said strain sensitive resistors 52 are buried in said silicon nitride layer 64,70 ({Fig. 5F}).

Referring to claim 7, Fisher discloses a plurality of strain sensitive resistors 52, formed in said diaphragm 49, furthermore, it appears that every material has a fracture strain and Young's modulus which is always greater than a predetermined desired predetermined amount.

Referring to claim 8, Fisher discloses a device as in claim 7, wherein said strain sensitive resistors 52 are piezoresistors (col. 6 lines 35-38).

Referring to claim 9, Fisher discloses a device as in claim 1, wherein said surface micromachined pressure sensor 44 is capable of sensing high pressures (col. 4 lines 40-58).

Referring to claim 10, Fisher discloses a device as in claim 8, further comprising a vacuum cavity 50, under said diaphragm material 48, said cavity 50 having a depth that is based on overpressure protection characteristics (col. 5 lines 62-68, col. 6 lines 1-22 {Fig. 5E}).

Referring to claim 15, Fisher discloses a device as in claim 2, wherein said resistors 52 are deposited polysilicon (col. 5 lines 4-12).

Referring to claim 28, Fusher discloses a device as in claim 7, wherein said strain sensitive resistors 52 have a size less than one third of a radius of said diaphragm 48 ({Fig. 5E}, col. 6 lines 47-50).

Referring to claim 29, Fisher discloses a device as in claim 1, wherein said substrate 46 is formed of a semiconductor material (col. 5 line 1 {Fig. 4}).

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Referring to claim 30, Fisher discloses a device as in claim 5, wherein said diaphragm layer 48 is formed of a plurality of separated layers 64,70 (col. 6 lines 1-3 {Fig. 5E}).

Referring to claim 31, Fisher discloses a device as in claim 30, wherein each of said separated layers 64,70 are formed of silicon nitride (col. 6 lines 1-3).

Referring to claim 32, Fisher discloses a device as in claim 32, wherein at least one of said separated layers 64,70 is formed of silicon nitride, and one of said separated layers 64,70 is formed of polysilicon (col. 6 lines 1-3).

Referring to claim 33, Fisher discloses a device, comprising:

A substrate 46 (col. 5 line 1); and

A surface micromachined pressure sensor 44, having a deformable membrane 48 formed adjacent said substrate 46, said membrane 48 having an outer size from edge to edge which is less than 100 microns, and having a thickness that is capable of sensing high pressures (col. 4 lines 43-49 {Fig. 4}).

Referring to claim 34, Fisher discloses a device as in claim 33, further comprising a plurality of strain sensitive resistors 52, formed within said membrane 48 (col. 5 lines 4-12 {Figs. 5E, 5F}).

Referring to claim 35, Fisher discloses a device as in claim 33, wherein said surface micromachined pressure sensor elements 44 includes a silicon nitride layer 64,70 (col. 5 lines 62-68, col. 6 lines 1-3 {Fig. 5E}).

Referring to claim 36, Fisher discloses a device as in claim 35, wherein said membrane 48 is formed of a plurality of layers 64,70 (col. 5 lines 62-68, col. 6 lines 1-3 {Fig. 5E}).

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Referring to claim 37, Fisher discloses a device as in claim 36, wherein each of said plurality of layers 64,70 includes silicon nitride (col. 5 lines 62-68, col. 6 lines 1-3 {Fig. 5E}).

Referring to claim 38, Fisher discloses a device as in claim 36, wherein at least one of said plurality of layers 64,70 include silicon nitride, and another of said layers 64,70 includes polysilicon (col. 5 lines 62-68, col. 6 lines 1-3 {Fig. 5E}).

Referring to claim 39, Fisher discloses a device as in claim 33, wherein said membrane 48 has a thickness that allows it to withstand high pressure (col. 6 lines 10-13).

Referring to claim 40, Fisher discloses a device as in claim 33, wherein said membrane 48 is attached to said substrate 46 along an outer periphery thereof, and also at a center thereof ({Fig. 4}).

Referring to claim 41, Fisher discloses a device as in claim 33, further comprising a vacuum cavity 50, under said diaphragm material 48, said cavity 50 having a depth that is based on desired overpressure protection characteristics (col. 5 lines 62-68, col. 6 lines 1-22).

Referring to claim 44, Fisher discloses a device as in claim 34, wherein said resistors 52 are formed of polysilicon (col. 5 lines 4-12).

Referring to claim 45, Fisher discloses a device as in claim 34, wherein said resistors 52 are formed of platinum (col. 4 lines 50-58).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 11-14, 42-43, 46, and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fisher (6,378,378) in view Sparks (5,719,069).

Referring to claims 11-14, 42-43, 46, and 60, Fisher teaches all the claim limitations including a substrate coupled to a deformable diaphragm, plurality of layers, and a vacuum chamber, but does not specifically state a cavity that is substantially equal to an amount of deflection of the diaphragm at a specified maximum pressure, an additional resistor, dummy diaphragm, and a capacitive sensor that senses an amount of deflection of a diaphragm. Sparks teaches a cavity 22 with delineation of a suspended beam or mass (col. 8 lines 43-57), circuit resistors formed on the surface of the substrate 18 (col. 6 lines 66-67, col. 7 lines 1-7), an additional wafer 56 (col. 8 lines 64-67, col. 9 line 1), and a capacitive accelerometer 110 ({Fig. 4}) that terminates a large deflectable proof mass suspended within a cavity 22 (col. 8 lines 59-62). One of ordinary skill in the art would have readily recognized the advantage and desirability to minimize the affect of mechanical stresses on piezoresistors and to form a capacitive sensing element.

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Response to Arguments

9. Applicant's arguments with respect to claims 1-15, 28-46, and 60-67 have been considered but are moot in view of the new ground(s) of rejection.

10. The examiner's position is that the new references clearly teach "a surface micromachined pressure sensor that is capable of sensing high pressures", "an additional resistor that is formed on a dummy diaphragm which is sized to compensate for offset voltage", a "vacuum cavity having a depth that is based on over pressure protection characteristics", "the size of the device is less than 100 microns from edge to edge", the diaphragm that is connected at least around a perimeter of the substrate, and "an extended portion at an area near a center of the diaphragm."

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Najafi et al (6,338,284) discloses a device similar to claimed invention.
- b. Gianchandani (6,470,754) discloses a device similar to claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alandra N. Ellington whose telephone number is (703)305-4449. The examiner can normally be reached on Monday - Friday, 6:30am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (703)305-4705. The fax phone numbers

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for the organization where this application or proceeding is assigned are (703)306-7382

for regular communications and (703)305-3839 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is (703)308-0956.

Alandra Ellington

A.U. 2855

ANE

November 4, 2002


HARSHAD PATEL
PRIMARY EXAMINER